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B3 The present invention is going to achieve achieves the above objects. The catalyst composition for isomerizing halogenated aromatics of the present invention is a catalyst composition for isomerizing halogenated aromatics, characterized in that the maximum diameter of secondary particles of the zeolite in the formed catalyst is 5 microns or less. The isomerizing catalyst composition of the present invention includes the following preferable embodiments.

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Mordenite is a zeolite which gives an X-ray diffraction pattern shown in Table 1 below.

[Table 1]

X-ray diffraction pattern of mordenite

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Lattice spacing	d(Å)	Intensity
13.6	±0.2	M
10.2	±0.2	W
9.0	±0.2	S
6.56	±0.1	S
6.40	±0.1	M
6.05	±0.1	W
5.80	±0.1	M
4.52	±0.08	M
3.99	±0.08	S
3.83	±0.08	W
3.76	±0.08	W
3.53	±0.05	W
3.46	±0.05	VS
3.38	±0.05	S
3.28	±0.05	W
3.20	±0.05	S
3.15	±0.05	W
2.89	±0.05	M
2.51	±0.05	W

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B5 As a general trend, the primary particle size of mordenite tends to be smaller if an a nitrogen containing organic base such as tetraethylammonium hydroxide or a surfactant such as polyethylene glycol is present in the reaction mixture, though this cannot be generally said since the primary particle size is affected variously by the reaction mixture composition at the time of synthesis, crystallization temperature, crystallization time, stirring speed, etc. Furthermore, for the composition ratios in the reaction mixture, since the particle size complicatedly changes, depending on the silica and alumina contents and alkali concentration, it is preferable to select the optimum composition ratios. As for crystallization conditions, if the crystallization temperature is lower, or if the crystallization time is shorter, or if the stirring speed is higher, the primary particle size tends to be smaller. Irrespective of the method, in the present invention it is only required that mordenite is 0.2 micron or less in the longest axes of its primary particles.

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B6 The slurry was heated at 160°C for 72 hours with stirring (250 rpm) in a 1-liter autoclave. The reaction product was washed with distilled water and filtered five times and then dried overnight at about 120-C. Thus there was obtained a pentasil-type zeolite which gives an X-ray diffraction pattern shown in Table 2 below and has the silica/alumina molar ratio of 21.9.

[Table 2]

X-ray diffraction pattern of pentasil-type zeolite

Lattice spacing	d(Å)	Intensity
11.2	±0.2	VS
10.1	±0.2	S
9.8	±0.2	M
6.37	±0.1	W
6.00	±0.1	W
5.71	±0.1	W
5.58	±0.1	W
4.37	±0.08	W
4.27	±0.08	W
3.86	±0.08	VS
3.82	±0.08	VS
3.75	±0.08	S
3.72	±0.08	S
3.66	±0.05	M
3.00	±0.05	M
2.00	±0.05	W

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The formed pellet (30 g dry base) was treated with 10 wt% aqueous solution of ammonium chloride at 80-85°C for 1 hour. The ion-exchange treatment was repeated 5 times in the same manner as above. The treatment was followed by rinsing with distilled water 5 times. It was dried overnight at 120°C, to obtain an ammonium ion-exchanged formed pellet. Then, it was calcined at 550°C for 2 hours, to convert ammonium ions into hydrogen ions. Thus, there was obtained a catalyst compound A, which contained an acid type zeolite, the aperture of the largest pore of which comprised the 10-membered oxygen ring. SEM observation shows that the maximum diameter of secondary particles of the zeolite in the catalyst was 3 microns. An observed SEM image is shown in Fig. 1.

B7 Comparative Example 1 (Preparation of catalyst: catalyst composition B)

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B8 A catalyst composition B was obtained as described for preparing the catalyst composition A of Example 1, except that the kneading time for catalyst forming was about 30 minutes. SEM observation shows that the maximum diameter of secondary particles of the zeolite in the formed catalyst was 10 microns. An observed SEM image is shown in Fig. 2.

Example 3 (CT isomerization reaction)

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B9 The catalyst composition A (Example 2) and the catalyst composition B (Comparative Example 1) obtained by the above method and different in the maximum diameter of secondary particles of the zeolite, the aperture of the largest pore of which comprised the 10-membered oxygen ring, in the formed catalyst were used for CT isomerization reaction tests in liquid phase. The results are shown in Table 3 below.

[Table 3] Evaluation of catalytic performance (CT isomerization reaction)

Catalyst	A (Example 2)	B (Comparative Example 1)
Reaction conditions		
Reaction temperature °C	260	260
Reaction pressure MPa-G	3. 4	3. 4
WHSV Hr	1. 5	1. 5
Reaction time Hrs	202	206
Supplied raw material		
o-CT/benzene wt/wt	2/1	2/1
o-CT isomerization rate wt%	51. 2	45. 6
CT isomer ratio wt%		
o-CT/CT	48. 8	54. 4
m-CT/CT	37. 6	33. 1
p-CT/CT	13. 6	12. 5

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The catalyst composition A (Example 2) and the catalyst composition B (Comparative Example 1) obtained by the above method and different in the maximum diameter of secondary particles of the zeolite, the aperture of the largest pore of which comprised the 10-membered oxygen ring, in the formed catalyst were used for o-DCB isomerization reaction tests. The results are shown in Table 4 below.

[Table 4] Evaluation of catalytic performance (DCB isomerization reaction)

Catalyst	A (Example 2)	B (Comparative Example 1)
Reaction Conditions		
Reaction temperature °C	350	350
Reaction pressure MPa-G	2.9	2.9
WHSV Hr	4.0	4.0
Reaction time Hrs	24	24
o-DCB conversion percentage wt%	68.2	57.9
Reaction product wt%		
CB	0.01	0.02
o-DCB	31.77	42.13
m-DCB	46.50	41.43
p-DCB	21.72	16.42
ΣDCB	99.99	99.98

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The raw material obtained by nitrogen bubbling of o-DCB for removing oxygen (dissolved oxygen content nearly 0 ppm, measured by a polarographic dissolved oxygen meter) was treated to be dehydrated by a molecular sieve, and brought into contact with the catalyst composition A, for a liquid phase isomerization reaction test. The reaction conditions are shown in Table 5 below.

[Table 5]

Reaction temperature °C	324
Reaction pressure MPa-G	3.9
WHSV Hr ⁻¹	0.4

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An isomerization reaction test was carried out as described in Example 5, except that

o-DCB saturated with air (dissolved oxygen content about 40 ppm, measured by a polarographic dissolved oxygen meter) was used as the raw material. The results are shown in Fig. 3 and Table 6 below.

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{Table 6}

	Dissolved oxygen content of raw material	Catalyst degradation rate
Example 5	0 ppm	0.33%/day
Comparative Example 2	Approx. 40 ppm	0.63%/day

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Seven catalyst compositions C (Example 10) through I (Comparative Example 3) prepared as described above were tested in DCT isomerization reaction. The results are shown in Table 7 below.

[Table 7] Evaluation of catalytic performance (DCT isomerization reaction)

Catalyst	Supplied raw material	C (Example 10)	D (Example 10)	E (Example 11)	F (Example 11)	G (Example 12)	H (Example 13)	I Comparative Example 3)
Reaction conditions								
Reaction temperature °C		320	320	320	320	335	330	345
Reaction pressure MPa-G		8.9	8.9	8.9	8.9	8.9	8.9	8.9
H/DCT mole/mole		0.06	0.06	0.06	0.06	0.06	0.06	0.06
WHSV Hr ⁻¹		2.0	2.0	2.0	2.0	2.0	2.0	2.0
Reaction time Hrs		140	144	136	150	146	140	150
Reaction product wt%								
Benzene, toluene, xylene		0.21	0.19	0.18	0.18	0.22	0.21	0.23
Chlorobenzene		0.49	0.52	0.50	0.45	0.56	0.54	0.64
Chlorotoluene		1.01	0.80	0.77	0.90	0.82	0.77	1.04
Dichloro-benzene		1.14	1.08	1.04	0.96	1.24	1.21	1.31
Dichloro-xylene	1.13	2.46	2.42	2.40	2.32	2.63	2.59	3.07
ΣCEB	98.87	94.69	94.99	95.11	95.19	94.53	94.68	93.71
DCT isomer ration wt%								
2, 5-DCT/DCT	45.03	39.07	38.60	38.72	38.19	38.90	38.32	38.52
2, 6-DCT/DCT	0.88	6.33	6.78	6.64	7.00	6.39	6.98	6.71
3, 5-DCT/DCT	11.26	12.59	12.70	12.63	12.65	12.68	12.77	12.56
2, 4-DCT/DCT	34.35	31.75	31.51	31.58	31.43	31.66	31.27	31.63
3, 4-DCT/DCT	3.84	4.74	4.85	4.86	5.10	4.80	5.00	4.98
2, 3-DCT/DCT	4.64	5.52	5.56	5.57	5.63	5.56	5.66	5.60

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The catalyst composition F (Example 11) was tested in CEB isomerization reaction, and the results are shown in Table 8 below.

[Table 8] Evaluation of catalytic performance (CEB isomerization reaction)

Catalyst	Supplied raw material	F (Example 11)
Reaction conditions		
Reaction temperature °C		245
Reaction pressure Mpa-G		4.0
H/DCT mole/mole		0.06
WHSV Hr ⁻¹		1.3
Reaction time Hrs		188
Reaction product wt%		
Low boiling point compounds		0.02
Benzene		0.10
Ethylbenzene	0.21	0.38
Chlorobenzene	0.06	0.61
ΣCEB	99.73	95.79
High boiling point products		2.10
CEB isomer ratio wt%		
o-CEB/CEB	53.13	31.96
m-CEB/CEB	8.70	48.12
p-CEB/CEB	38.17	19.92
CEB recovery rate wt%		96.05